Kramer Electronics, Ltd.

USER MANUAL

Model:

VP-4x4K

4x4 UXGA / Audio Matrix Switcher

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This addendum replaces Figure 7 and Figure 8 in the User Manual, as well as the first paragraph in section 11.2

In section 6.5.1.1, Figure 7 and Figure 8 are replaced with Figure A and Figure B, respectively:

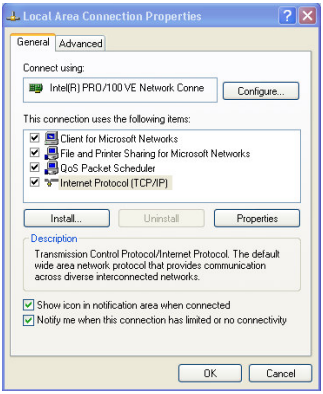


Figure A: Local Area Connection Properties Window

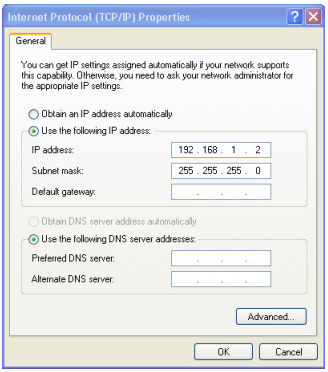

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 1 . 2
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure B: Internet Protocol (TCP/IP) Properties Window

11.2 Kramer Protocol 3000

The Kramer Protocol 3000 lets you control the **VP-4x4K** from any standard terminal software (for example, the Windows® HyperTerminal Application).

This RS-232/RS-485 communication protocol[1] uses a data rate of 115200 baud, with no parity, 8 data bits and 1 stop bit.

1 Refer to our Web site at http://www.kramerelectronics.com for details

1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront the video, audio, presentation, and broadcasting professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 1,000-plus different models now appear in 11 groups[1] that are clearly defined by function.

Congratulations on purchasing your Kramer **VP-4x4K** *4x4 UXGA / Audio Matrix Switcher*. This product is ideal for the following typical applications:

- Professional display systems requiring true 4x4 matrix operation
- Multimedia and presentation source and acceptor selection
- Remote monitoring of computer activity in schools and businesses
- Rental/staging applications

The package includes the following items:

- **VP-4x4K** *4x4 UXGA / Audio Matrix Switcher*
- Windows®-based Kramer control software[2]
- Device Properties Ethernet configuration software[2]
- Power cord[3] and Null-modem adapter
- Infrared remote control transmitter (including the required batteries and a separate user manual[4]) and this user manual[4]

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[5]

2.1 Quick Start

This quick start chart summarizes the basic setup and operation steps.

1 GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Matrix Switchers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Products

2 Download the latest software from our Web site at http://www.kramerelectronics.com

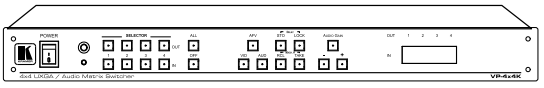
3 We recommend that you use only the power cord that is supplied with this machine

4 Download up-to-date Kramer user manuals from our Web site at http://www.kramerelectronics.com

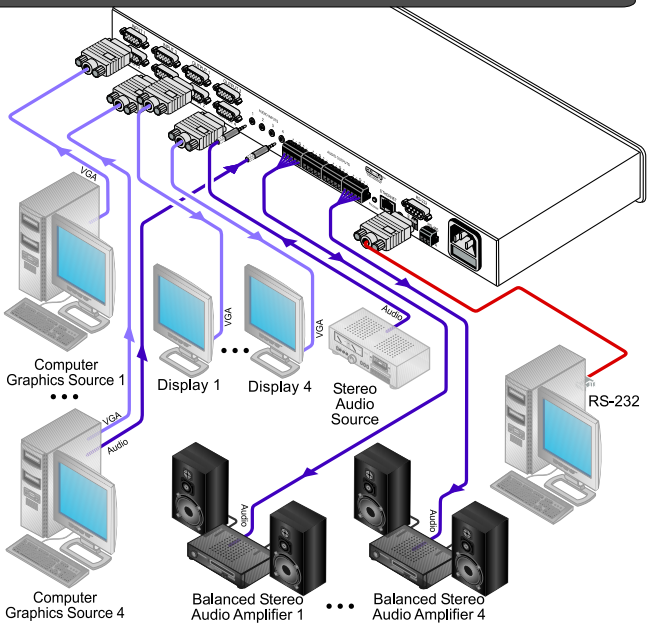
5 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

Step 1: Mount the machine - see section 5

Mount the machine in a rack or stick the 4 rubber feet to the underside

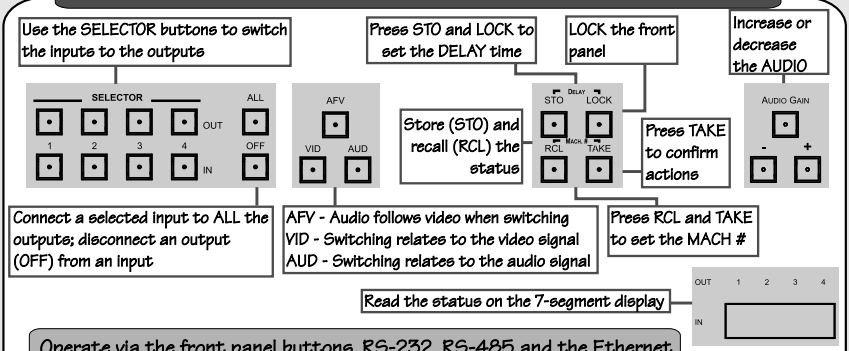


Step 2: Connect the inputs and outputs - see section 6



Step 3: Turn the power ON

Step 4: Operate the machine - see section 7



3 Overview

The **VP-4x4K** is a true 4x4 matrix switcher for computer graphics (up to and exceeding UXGA) signals and balanced stereo audio signals. The **VP-4x4K** lets you simultaneously route any or all of the four inputs to any or all of the four outputs.

In addition, the **VP-4x4K** features:

- A video bandwidth of 400MHz that ensures transparent UXGA performance
- DC coupled inputs and outputs
- A selectable delayed switching mode (ranging from 0 to 3.5sec[1]) for clean transitions (seamless switching) when switching between non-genlocked sources
- Audio gain control for the inputs and the outputs
- Audio-follow-video and breakaway options
- Storing and recalling setup options
- A TAKE button for precise switch control that lets you execute multiple switches all at once
- A LOCK button to prevent tampering with the front panel
- The ability to automatically detect connected input signals (the respective button illuminates in green)
- Our innovative integrated sync processing; KRISP™ technology that lets you achieve a sharp, stable image when the sync level is too low, by restoring the sync signal waveform

Control the **VP-4x4K** using the front panel buttons, or remotely via:

- RS-485 or RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller
- The Kramer **RC-IR2** Infrared Remote Control Transmitter
- The ETHERNET

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality and position your Kramer **VP-4x4K** away from moisture, excessive sunlight and dust

4 Your VP-4x4K UXGA / Audio Matrix Switcher

Figure 1, Table 1 and Table 2 define the **VP-4x4K**.

1 In increments of 0.5sec

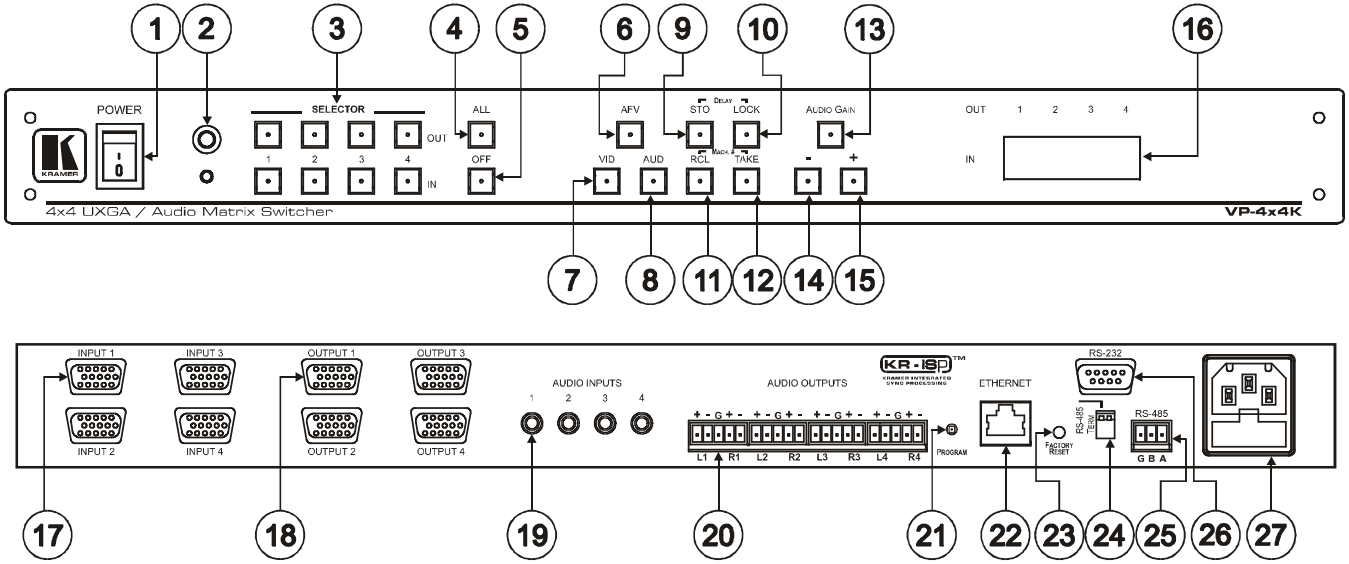


Figure 1: VP-4x4K 4x4 UXGA / Audio Matrix Switcher

Table 1: Front Panel VP-4x4K 4x4 UXGA / Audio Matrix Switcher Features

#	Feature		Function
1	*POWER* Switch		Illuminated switch for turning the unit ON or OFF
2	IR Receiver		Signals from the remote control transmitter illuminate the LED
3	*SELECTOR* Buttons	*OUT*	Select the output to which the input is switched
		IN	Select the input to switch to the output[1] When a signal is detected, the input button illuminates in green
4	*ALL* Button		Pressing ALL before pressing an input button connects that input to all outputs[2]
5	*OFF* Button		Pressing OFF after pressing an output button disconnects that output from the inputs. To disconnect all the outputs, press the ALL button and then the OFF button
6	*AFV* Button		When illuminated, the audio channels follow the video channels[3]. The button is illuminated when the AFV mode is selected
7	*VID* Button		When illuminated[4], actions relate to video
8	*AUD* Button		When illuminated[5], actions relate to audio
9	*STO*[6] Button		Pressing STO (STORE) followed by an output or an input button stores the current setting[7]
10	*LOCK*[6] Button		Disengages the front panel switches
11	*RCL*[8] Button		Pressing *RCL* (RECALL) followed by an output or an input button displays a stored setup
12	*TAKE*[8] Button		Pressing TAKE toggles the mode between the CONFIRM mode[9] and the AT ONCE mode (user confirmation per action is unnecessary). When in CONFIRM mode, actions are confirmed by pressing the TAKE key
13	*AUDIO GAIN* Button		Press to adjust the audio input or output gain (see section 7.2)
14	- Button[10]		Press to decrease the numerical value[11]
15	+ Button[10]		Press to increase the numerical value[11]
16	*STATUS 7-segment Display*		Displays the selected input switched to the output (marked above each input)[12]

1 The SELECTOR IN and OUT buttons also store/recall the input/output configurations (see section 7.8)

2 For example, press ALL and then Input button # 2 to connect input # 2 to all the outputs

3 If the AUDIO differs from the VIDEO, the TAKE button will flash, and you have to press the TAKE button to confirm the modification

4 The VID button is illuminated when in breakaway mode and actions relate to video

5 The AUD button is illuminated when in breakaway mode and actions relate to audio

6 Press the STO and LOCK buttons simultaneously to set the delay time (see section 7.3)

7 For example, press STO and then the Output button # 3 to store in Setup # 3 (see section 7.8)

8 Press the RCL and TAKE button simultaneously to set the machine number (see section 7.4)

9 When in the CONFIRM mode, the TAKE button illuminates

10 By pressing the + or - buttons continuously, you can speed up their response. For step-by-step response, press and release these buttons as many times as needed

11 Gain, switching delay time and machine number

12 Also displays the number of IN and OUT ports, the firmware version number, the MACHINE # and the audio gain level. Refer to section 7.1

Table 2: Rear Panel VP-4x4K 4x4 UXGA / Audio Matrix Switcher Features

#	Feature	Function
17	*INPUT* 15-pin HD Connectors	Connect to the video sources (from 1 to 4)
18	*OUTPUT* 15-pin HD Connectors	Connect to the acceptors (from 1 to 4)
19	*AUDIO INPUTS 3.5mm* Mini Plug Connectors	Connect to the unbalanced stereo audio sources (from 1 to 4)
20	*AUDIO OUTPUTS* Terminal block connectors	Connect to the balanced stereo audio acceptors (from 1 to 4)
21	*PROGRAM* Button	Not used (for technical staff use only)
22	*ETHERNET* Connector	Connects to the PC or other Serial Controller through computer networking
23	*Factory Reset* Button	Press to reset to the factory default definitions[1]: IP number – 192.168.1.39 Mask – 255.255.0.0 Gateway – 0.0.0.0 UDP port – 50000 TCP port – 5000 Protocol 3000 commands All 8 Presets deleted All audio channels set to 0dB Machine name – the last four digits of the machine's serial number DHCP disabled
24	*RS-485 TERM* Dipswitch	DIP 1 is for RS-485 Termination, DIP 2 is not used
25	*RS-485* Terminal Block Port	Pins B (-) and A (+) are for RS-485; Pin G (Ground) may be connected to the shield of the cable if desired
26	*RS-232* 9-pin D-sub Connector	Connects to the PC or the Remote Controller
27	Power Connector with Fuse	AC connector enabling power supply to the unit

1 Turn the POWER switch OFF and then ON again while pressing the Factory Reset button. The unit will power up and load its memory with the factory default definitions

5 Installing the VP-4x4K in a Rack

This section describes what to do before installing in a rack and how to rack mount.

Before Installing in a Rack

Before installing in a rack, be sure that the environment is within the recommended range:	
Operating temperature range	+5º to +45º C (41º to 113º F)
Operating humidity range	10 to 90% RHL, non-condensing
Storage temperature range	-20º to +70º C (-4º to 158º F)
Storage humidity range	5 to 95% RHL, non-condensing

CAUTION!!

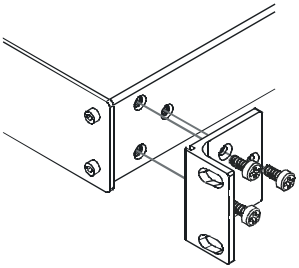
When installing in a 19" rack, avoid hazards by taking care that:

1. It is located within the recommended environmental conditions, as the operating ambient temperature of a closed or multi unit rack assembly may exceed the room ambient temperature.
2. Once rack mounted, enough air will still flow around the machine.
3. The machine is placed straight in the correct horizontal position.
4. You do not overload the circuit(s). When connecting the machine to the supply circuit, overloading the circuits might have a detrimental effect on overcurrent protection and supply wiring. Refer to the appropriate nameplate ratings for information. For example, for fuse replacement, see the value printed on the product label.
5. The machine is earthed (grounded) in a reliable way and is connected only to an electricity socket with grounding. Pay particular attention to situations where electricity is supplied indirectly (when the power cord is not plugged directly into the socket in the wall), for example, when using an extension cable or a power strip, and that you use only the power cord that is supplied with the machine.

How to Rack Mount

To rack-mount a machine:

1. Attach both ear brackets to the machine. To do so, remove the screws from each side of the machine (3 on each side), and replace those screws through the ear brackets.



2. Place the ears of the machine against the rack rails, and insert the proper screws (not provided) through each of the four holes in the rack ears.

Note that:

- **In some models, the front panel may feature built-in rack ears**
- Detachable rack ears can be removed for desktop use
- Always mount the machine in the rack before you attach any cables or connect the machine to the power
- If you are using a Kramer rack adapter kit (for a machine that is not 19"), see the Rack Adapters user manual for installation instructions (you can download it at: http://www.kramerelectronics.com)

6 Connecting the VP-4x4K 4x4 UXGA / Audio Matrix Switcher

This section describes how to:

- Connect the **VP-4x4K** rear panel (see section 6.1)
- Connect a balanced/unbalanced stereo audio output (see section 6.2)
- Connect the **VP-4x4K** to a controlling device via RS-232 (see section 6.3)
- Connect several **VP-4x4K** machines (see section 6.4)
- Connect to the ETHERNET (see section 6.5)
- Set the dipswitches (see section 6.6)

6.1 Connecting the VP-4x4K Rear Panel

To connect[1] the **VP-4x4K**, as illustrated in the example in Figure 2, do the following[2]:

1. Connect up to four computer graphics video sources to the 15-pin HD INPUT connectors (from INPUT 1 to INPUT 4).
2. Connect up to four unbalanced stereo audio sources (for example, the audio source of the computer[3]) to the AUDIO INPUT 3.5mm mini-plug connectors (from 1 to 4).
3. Connect the four 15-pin HD OUTPUT connectors to up to four computer graphics video acceptors (for example, displays).
4. Connect the four AUDIO OUTPUT terminal block connectors to up to four balanced stereo audio acceptors[4] (for example, balanced stereo audio amplifiers with speakers).
5. Set the dipswitches (see section 6.6).
6. As an option, you can connect a PC and/or controller to the RS-232 port (see section 6.3), the RS-485 port (see section 6.4) and the ETHERNET (see section 6.5).
7. Connect the power cord[5].

1 You do not need to connect all the inputs and outputs

2 Switch OFF the power on each device before connecting it to your VP-4x4K. After connecting your VP-4x4K, switch on its power and then switch on the power on each device

3 Alternatively, you can connect a separate audio source (as shown for input 1 in Figure 2), or no source at all

4 See section 6.2

5 We recommend that you use only the power cord that is supplied with this machine

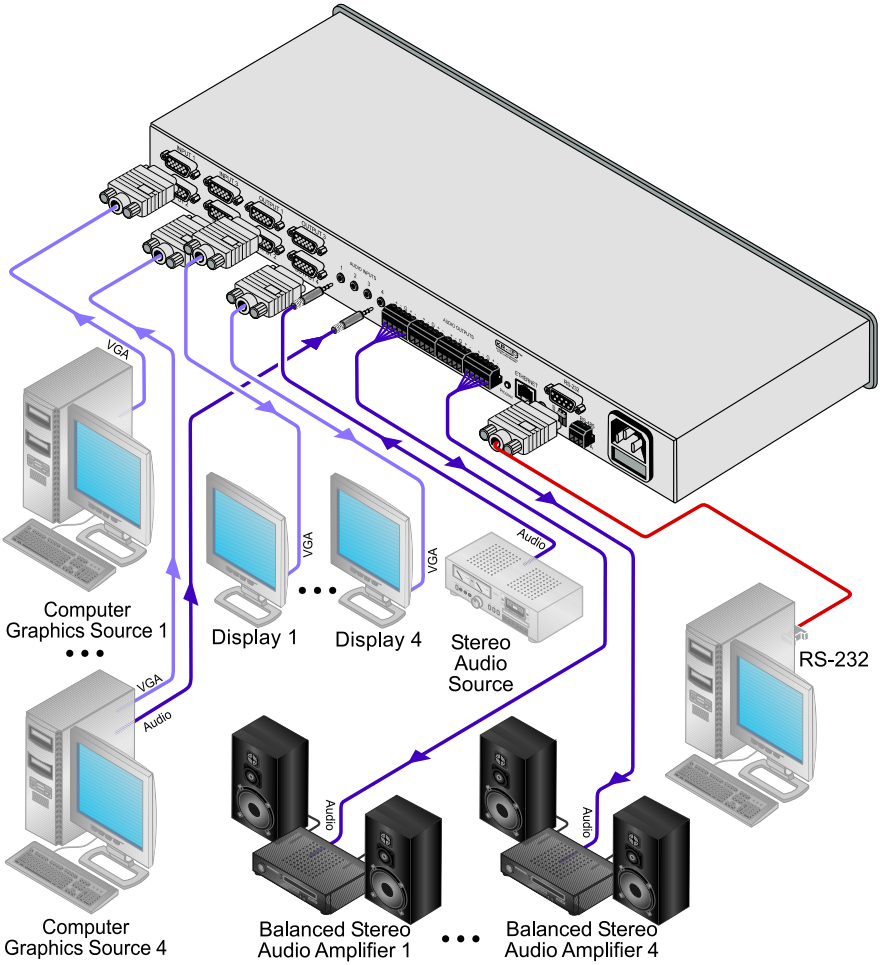


Figure 2: Connecting the VP-4x4K 4x4 UXGA / Audio Matrix Switcher

6.2 Connecting the Balanced/Unbalanced Stereo Audio Output

This section illustrates how to wire:

- A balanced output connection (see Figure 3)
- An unbalanced audio output (see Figure 4)

Figure 3 illustrates how to wire a balanced output connection (for example, AUDIO OUTPUT 1):

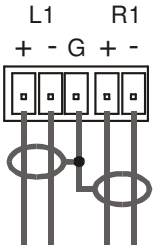


Figure 3: Connecting the Balanced Stereo Audio Output

Figure 4 illustrates how to wire an unbalanced acceptor to the balanced output of the unit (for example, AUDIO OUTPUT 1):

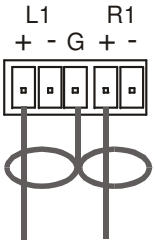


Figure 4: Connecting the Unbalanced Stereo Audio Output

6.3 Connecting a PC

To connect a PC to the **VP-4x4K** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 9-pin D-sub rear panel port on the Master **VP-4x4K** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 9-pin D-sub port on your PC

To connect a PC to the **VP-4x4K** unit, without using a Null-modem adapter:

- Connect the RS-232 9-pin D-sub port on your PC to the RS-232 9-pin D-sub rear panel port on the Master **VP-4x4K** unit, as Figure 5 illustrates

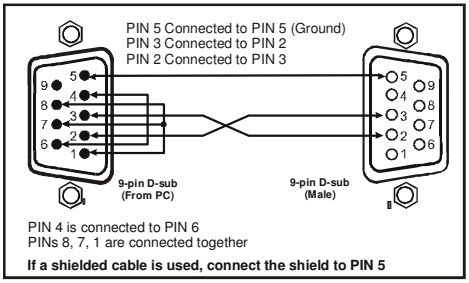

PIN 5 Connected to PIN 5 (Ground)
PIN 3 Connected to PIN 2
PIN 2 Connected to PIN 3
9-pin D-sub (From PC)
9-pin D-sub (Male)
PIN 4 is connected to PIN 6
PINs 8, 7, 1 are connected together
If a shielded cable is used, connect the shield to PIN 5

Figure 5: Connecting a PC without using a Null-modem Adapter

6.4 Cascading Machines

You can cascade up to 16 **VP-4x4K** units with control from a PC or serial controller.

To cascade 16 individual **VP-4x4K** units via RS-485, as illustrated in the example in Figure 6, do the following:

1. Connect the sources and acceptors (see section 6.1).
2. Connect the RS-232 port of the first **VP-4x4K** unit to a PC using the Null-modem adapter provided with the machine (see section 6.3).
3. Connect the RS-485 terminal block port on the first **VP-4x4K** unit to the RS-485 port on the second **VP-4x4K** unit and so on, connecting all the RS-485 ports.
4. Set the first **VP-4x4K** unit as Machine # 1 and the following **VP-4x4K** units as Machine # 2 to Machine # 16 (see section 7.4).
5. On the first and last **VP-4x4K** units, set the RS-485 TERM dipswitch to ON, terminating the RS-485 line at 120Ω (see section 6.6), and set this dipswitch to OFF on the other **VP-4x4K** units.

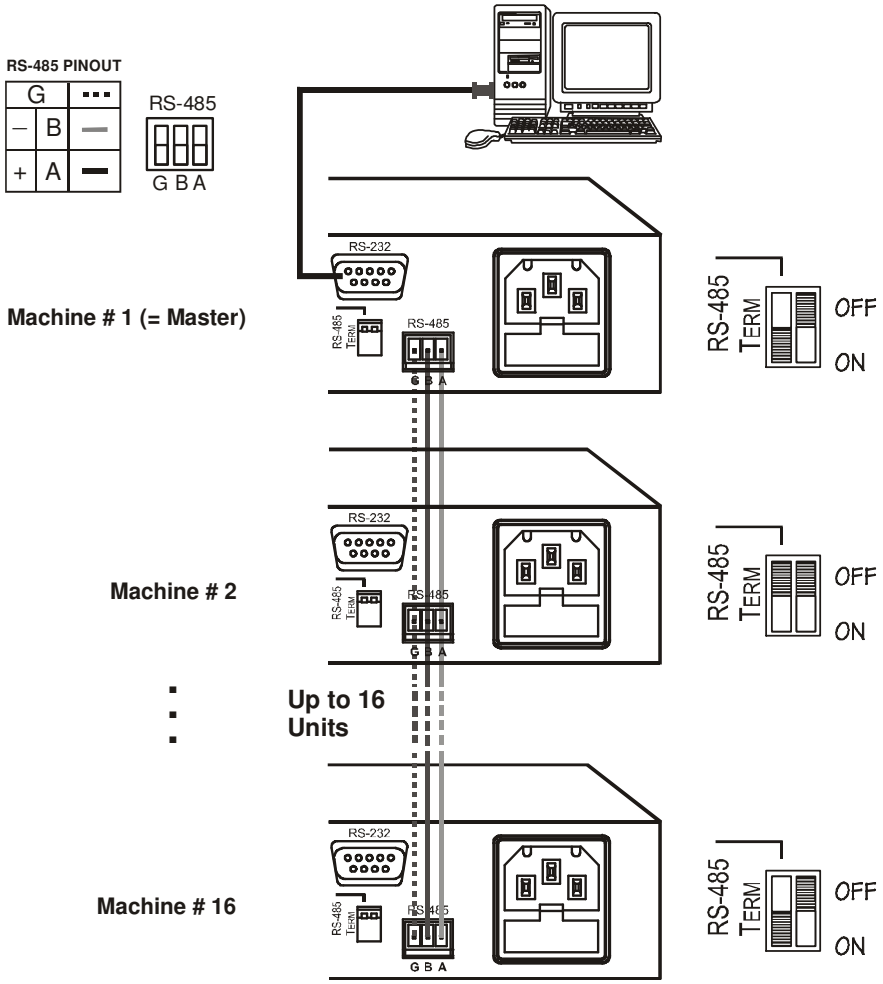


Figure 6: Control Configuration via RS-232 and RS-485

6.5 Configuring the Ethernet Port

To configure the Ethernet port, you have to connect your PC to the **VP-4x4K** either via the Ethernet (see section 6.5.1) or via a serial port (see section 6.3). Once the machine is connected, you can configure the Ethernet port.

6.5.1 Connecting via the Ethernet

You can connect the **VP-4x4K** via the ETHERNET in the following ways:

- For direct connection to the PC, use a crossover cable (see section 6.5.1.1)
- For connection via a network hub or network router, use a straight-through cable (see section 6.5.1.2)

6.5.1.1 Connecting the ETHERNET Port Directly to a PC (Crossover Cable)

You can connect the Ethernet port of the machine to the Ethernet port on your PC, via a crossover cable with RJ-45 connectors.

This type of connection is recommended for identification of the factory default IP Address[1] of the **VP-4x4K** during the initial configuration

After connecting the Ethernet port, configure your PC as follows:

1. Right-click the My Network Places icon on your desktop.
2. Select **Properties**.
3. Right-click Local Area Connection Properties.
4. Select **Properties**.
   The Local Area Connection Properties window appears.
5. Select the Internet Protocol (TCP/IP) and click the **Properties** Button (see Figure 7).

1 The default IP address is 192.168.1.39

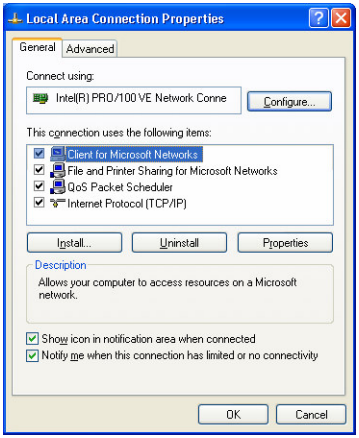


Figure 7: Local Area Connection Properties Window

6. Select Use the following IP Address, and fill in the details as shown in Figure 8.
7. Click **OK**.

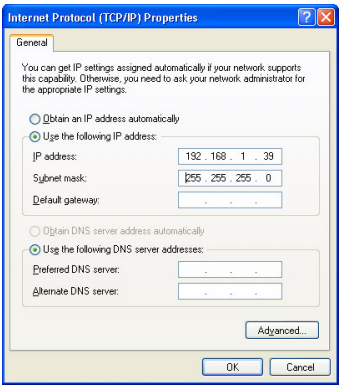

Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
192 . 168 . 1 . 39
Subnet mask:
255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

Figure 8: Internet Protocol (TCP/IP) Properties Window

6.5.1.2 Connecting the ETHERNET Port via a Network Hub (Straight-Through Cable)

You can connect the Ethernet port of the **VP-4x4K** to the Ethernet port on a network hub or network router, via a straight-through cable with RJ-45 connectors.

6.5.2 Ethernet Port Configuration

To configure the Ethernet port, download the *Device Properties* Ethernet configuration software. Extract the file to a folder and create a shortcut on your desktop to the file.

Follow these steps to configure the port:

1. Double click the desktop icon.
   The Connect screen appears as follows:

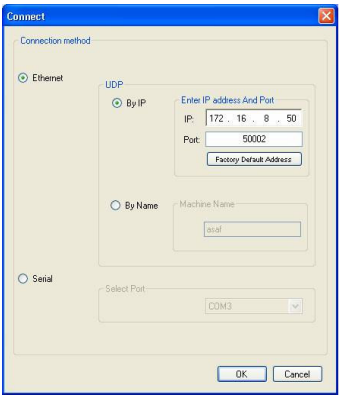


Figure 9: Connect Screen

2. Select the method to connect to the Ethernet port of the **VP-4x4K**.
   Select:
   - Ethernet, if you know the IP address number or the machine name. The default name for the machine is KRAMER_XXXX[1]
   - Serial, if you are connected via a serial port
3. Click OK.
   The Device Properties window appears:

1 The four digits are the last four digits of the machine's serial number.

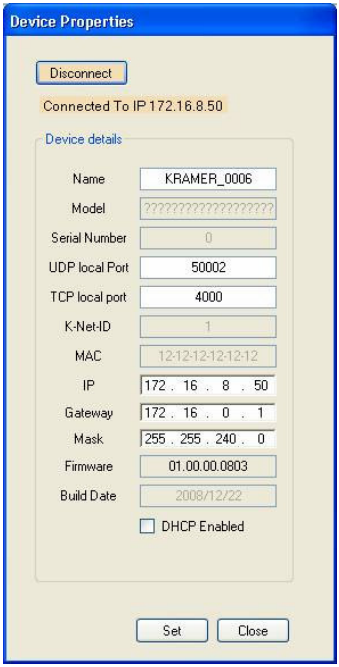


Figure 10: Device Properties Screen

4. If required, make changes and press Set. If not, click Close.

6.5.3 Control via the Ethernet Port

If you were connected via the serial port, you need to connect to the master unit (Mach No. 1) via the Ethernet, as described in section 6.5.1.

6.6 Dipswitch Settings

The **VP-4x4K** includes two dipswitches, as Figure 11 and Table 3 define. Only one of the dipswitches is configured:

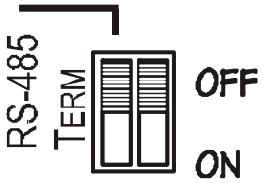


Figure 11: VP-4x4K Dipswitches

Table 3: Dipswitch Settings (Default Setting)

Function	Description
RS-485 TERM	ON for RS-485 line termination[1] with 120Ω OFF for no RS-485 line termination

7 Operating Your Audio Matrix Switcher

This section describes the characteristics of the 7-segment display (see section 7.1), as well as how to:

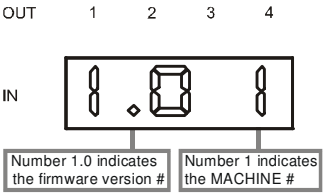
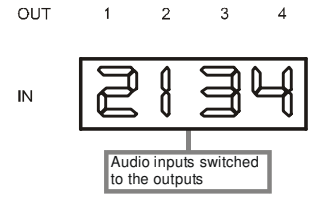
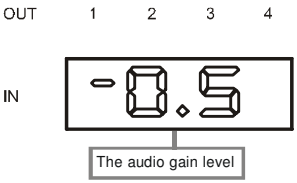
- Adjust the audio gain, see section 7.2
- Set the switching delay time, see section 7.3
- Set the machine number, see section 7.4
- Choose the audio-follow-video or the break option, see section 7.5
- Switch OUT-IN combinations, see section 7.6
- Confirm settings, see section 7.7
- Store and recall input/output configurations, see section 7.8
- Lock the front panel buttons, see section 7.9

1 When cascading machines, set this dipswitch to ON for the first and last units only (otherwise, set it to OFF)

7.1 Displaying Unit Characteristics

The 7-segment display shows several sets of information, as defined in the examples shown in Table 4:

Table 4: STATUS 7-segment Display

The STATUS Display	Shows:	When:
Initial Display[1]  	Unit characteristics: Firmware version Machine number	About 2 seconds (automatically) after switching on the power
Normal Display[2]  	Normal display: Inputs switched to the outputs	During normal operation, appears a few seconds after the first display
Audio Gain Display[3]  	Audio gain mode	After pressing the AUDIO GAIN button and selecting an output or an input

In addition, the 7-segment display shows the:

- Switching delay time when setting the delay time (see section 7.3)
- Selected machine number when setting the machine number (see section 7.4)

1 The STATUS shown here is an example of what could typically be displayed. The actual display depends on the current firmware version and machine number

2 The STATUS shown here is an example of what could typically be displayed. The actual display depends on the current video and audio switching status

3 The STATUS shown here is an example of what could typically be displayed. The actual display depends on the current audio gain level

7.2 Adjusting the Audio Gain

You can adjust the audio gain for each input (from -100dB to +20dB) and output signal (from -100dB to +6dB), by using the AUDIO GAIN button on the front panel.

To set the audio gain, do the following[1]:

1. Press the AUDIO GAIN button on the front panel.
2. Press a SELECTOR IN or OUT button to select the input or output for which you want to increase or decrease the gain.
3. Press the + or – buttons on the front panel to increase or decrease the gain, respectively.

To exit the audio gain function, press any of the control buttons. If unused, this command times out after 20 seconds.

You can use the **RC-IR2** remote controller to adjust the output volume. To adjust the volume of an output, press the VOL +/- key (to increase or decrease the volume respectively) and then the number of that output

7.3 Setting the Switching Delay Time

You can achieve clean transitions when switching between non-genlocked sources by setting the delay time—ranging from 0sec to 3.5sec[2]—via the DELAY dipswitches. The **VP-4x4K** unit is shipped (its factory default state) with no delay, that is, the DELAY is set to 0sec.

To set the delay time, do the following:

1. Press the STO and LOCK front panel buttons simultaneously to access the DELAY mode.
   The 7-segment display shows the current switching delay time.
2. Use the + and – front panel buttons to set the delay time as required.

To confirm and exit the DELAY mode, press the either the AUD, VID, or AFV button, the display shows the inputs switched to the outputs. If not confirmed, this command times out after 20 seconds.

1 When using the RC-IR2 remote controller you can only adjust the output volume. to adjust the volume of an output, press the VOL +/- key (to increase or decrease the volume respectively) and then the number of that output

2 In increments of 0.5sec

7.4 Setting the Machine Number

The MACH. # (machine number) determines the position of a **VP-4x4K** unit when cascading units.

To set the MACH. #, do the following:

1. Press the front panel buttons: RCL and TAKE simultaneously to access the MACH. # mode.
   The 7-segment display shows the current machine number.
2. Use the + and – front panel buttons to set the machine number as required.

To confirm and exit the MACH. # mode, press either the AUD, VID or AFV buttons. If not confirmed, this command times out after 20 seconds.

7.5 Choosing the Audio-Follow-Video or Breakaway Option

You can switch stereo audio signals in one of two ways, either:

- Audio-follow-video (AFV), in which all operations and status indicators relate to both the video and the audio channels[1]; or
- Breakaway, in which video and audio channels switch independently

If the audio differs from the video, then the TAKE button flashes. Also, the audio outputs, which will be changed, will flash[2] in the status 7-segment display. Press the TAKE button to confirm the modification. The audio will follow the video.

If not confirmed, this command times out after 20 seconds and the 7-segment display shows the audio configuration.

7.5.1 Setting the Audio-Follow-Video Option

To set the Audio-Follow-Video (AFV) option:

1. Press the AFV button.
   The AFV button illuminates. The audio will follow the video and the 7-segment display shows the video configuration.
   If the audio configuration differs from the video configuration, the channels that differ will blink[3], and require reconfiguring for AFV operation.
2. Press the TAKE button to confirm the modification (reconfiguring the audio according to the video).

1 Audio and video connections are the same

2 Warning that you are about to modify the audio configuration for AFV operation

3 Warning that changes are about to occur in the audio section

7.5.2 Setting the Breakaway Option

To set the Breakaway option:

1. Press either the AUD (for audio control only) or the VID (for video control only) button.
2. If the AUD button illuminates, all switching operations relate to the Audio section.
3. If the VID button illuminates, all switching operations relate to the Video section.

7.6 Switching OUT-IN Combinations

To switch a video/audio input to a video/audio output, do the following:

1. Press an OUT button[1].
   The corresponding Audio and[2]/or Video IN STATUS 7-segment displays[3] blink.
2. Press an IN button[4].
   The selected input switches to the selected output.

For example, press the ALL button and then IN button # 2 to connect input # 2 to all the outputs.

7.7 Confirming Settings

Choose to work in the AT ONCE or the CONFIRM mode.

In the AT ONCE mode:

- You save time
- Actions require no user confirmation
- Execution is immediate
- No protection is offered against changing an action in error

1 Either 1, 2, 3, 4 or ALL. To exit this command, press the OUT button again

2 When the audio-follow-video option is active (refer to section 7.5.1)

3 Items 8 and 9, respectively, in Figure 1

4 Either 1, 2, 3, 4 or OFF. If the IN button is not pressed within 20 seconds, this operation times out

In the CONFIRM mode:

- You have an optional method to help avoid making a mistake
- Every action requires user confirmation
- Execution is delayed[1] until the user confirms the action
- Protection is offered to prevent erroneous switching
- You can key-in several actions and then confirm them by pressing the TAKE button once, to simultaneously switch all monitors

Pressing an OUT-IN combination when your **VP-4x4K** operates in the AT ONCE mode implements the switch immediately. When the **VP-4x4K** operates in the CONFIRM mode, press the blinking TAKE button to authorize the switch.

7.7.1 Toggling between the AT ONCE and CONFIRM Modes

To toggle between the AT ONCE and CONFIRM modes, do the following:

1. Press the TAKE button to toggle from the AT ONCE mode[2] to the CONFIRM mode[3].
   Actions now require user confirmation and the TAKE button illuminates.
2. Press the illuminated TAKE button to toggle from the CONFIRM mode back to the AT ONCE mode.
   Actions no longer require user confirmation and the TAKE button no longer illuminates.

7.7.2 Confirming a Switching Action

To confirm a switching action (in CONFIRM mode), do the following:

1. Press an OUT-IN combination.
   The corresponding 7-segment display blinks. The TAKE button also blinks.
2. Press the blinking TAKE button to confirm the action.
   The corresponding 7-segment display no longer blinks. The TAKE button illuminates.

To confirm several actions (in CONFIRM mode), do the following:

1. Press each OUT-IN combination in sequence.
   The corresponding 7-segment display blinks. The TAKE button also blinks.
2. Press the blinking TAKE button to confirm all the actions.
   The corresponding 7-segment display no longer blinks. The TAKE button illuminates.

1 Failure to press the TAKE button within one minute (the Timeout) will abort the action

2 The TAKE button does not illuminate

3 The TAKE button illuminates

7.8 Storing/Recalling Input/Output Configurations

You can store and recall[1] up to eight[2] input/output setups using the four SELECTOR IN and the four SELECTOR OUT buttons, as Figure 12 illustrates. For example, setup 2 is stored[3] in OUT 1 and setup 7 is stored in IN 3.

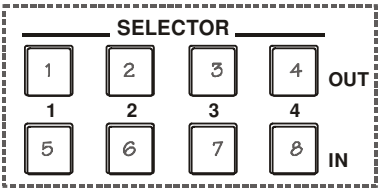


Figure 12: SELECTOR Buttons[4]

7.8.1 Storing an Input/Output Configuration

To store the current status in memory, do the following:

1. Press the STO button.
   The STO button blinks.
2. Press one of the eight SELECTOR buttons.
   The memory stores the data at that reference.

7.8.2 Recalling an Input/Output Configuration

To recall an input/output configuration, do the following:

1. Press the RCL button.
   The RCL button blinks.
2. Press the appropriate SELECTOR button.
   The memory recalls the stored data from that reference.

If you cannot remember which of the eight input/output configurations is the one that you want, set the **VP-4x4K** to the CONFIRM mode and manually scan all the input/output configurations until you locate it.

1 The 8 input/output configurations (or setups) also include the relevant audio-follow-video / breakaway option definition

2 When operating via RS-232 communication or the IR remote control transmitter, you can store/recall up to 16 setups

3 And can be recalled

4 The gray numbers (1 to 8) in Figure 12 that illustrate the corresponding store/recall configuration number, are for the purpose of illustration only and do not actually appear on the buttons

7.8.3 Deleting an Input/Output Configuration

To delete an input/output configuration, do the following:

1. Press the STO and RCL buttons simultaneously.
   Both the STO and RCL buttons blink.
2. Press the appropriate SELECTOR button.
   This erases that specific input/output configuration from the memory, leaving it empty and available[1].

7.9 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the front panel, lock your **VP-4x4K**. Unlocking releases the protection mechanism.

To lock the **VP-4x4K**:

- Press the LOCK button for more than 2 seconds
  The LOCK button illuminates, freezing the front panel controls. Pressing a button will have no effect, except to cause the LOCK button to blink[2]. Nevertheless, even though the front panel is locked you can still operate your PC control software

To unlock the **VP-4x4K**:

- Press the illuminating LOCK button for more than 2 seconds
  The **VP-4x4K** unlocks and the LOCK button no longer illuminates

1 Storing a new configuration over a previous configuration (without deleting it first) replaces the previous configuration

2 Warning that you need to unlock to regain control via the front panel

8 Firmware Upgrade

The **VP-4x4K** firmware is located in FLASH memory, which lets you upgrade to the latest Kramer firmware version in minutes! The process involves:

- Downloading from the Internet (see section 8.1)
- Connecting the PC to the RS-232 port (see section 8.2)
- Upgrading Firmware (see section 8.3)

8.1 Downloading from the Internet

You can download the up-to-date file from the Internet. To do so:

1. Go to our Web site and download the file: "*FlashLoader.zip*" from the Technical Support section.
2. Extract the file: "*FlashLoader.zip*" to a folder (for example, C:\Program Files\Kramer Flash).
3. Create a shortcut on your desktop to the file: "*FlashLoader*".
4. Go to our Web site and download the latest **VP-4x4K** firmware version.

8.2 Connecting the PC to the RS-232 Port

Before installing the latest Kramer firmware version on a **VP-4x4K** unit, connect the RS-232 9-pin D-sub rear panel port on the **VP-4x4K** unit to the Null-modem adapter and connect the Null-modem adapter with a 9-wire flat cable to the RS-232 9-pin D-sub COM port on your PC (see section 6.3).

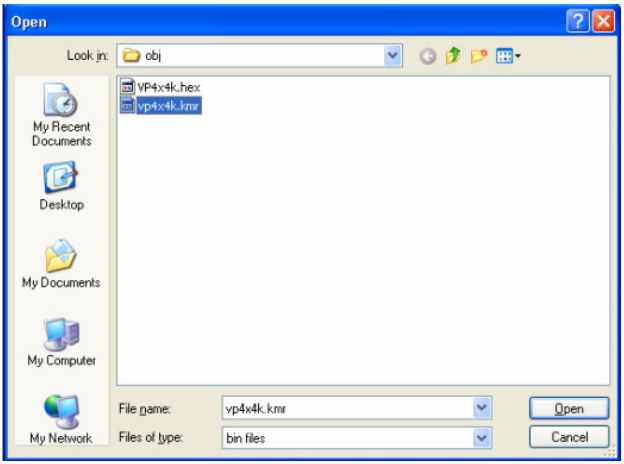
8.3 Upgrading Firmware

Follow these steps to upgrade the firmware:

1. Double click the desktop icon: "*FlashLoader*".
2. Connect the power on the **VP-4x4K** unit and switch it ON.
3. Set the appropriate COM port.
   The following window appears:

Figure 13: FlashLoader Window

4. Click the Send Bin File button.
   The following window appears:



Loading the Latest Firmware

5. Select the latest **VP-4x4K** firmware version, and click Open.
   Wait for completion of the upgrade procedure. The new firmware version appears in the INPUT STATUS 7-segment Display.

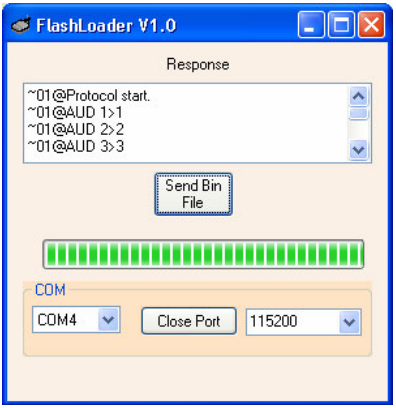


Figure 14: Flash Upgrade Process

6. If required, disconnect the RS-232 rear panel port on the **VP-4x4K** unit from the Null-modem adapter.

9 Technical Specifications

Table 5 includes the technical specifications:

Table 5: Technical Specifications[1] of the VP-4x4K 4x4 UXGA / Audio Matrix Switcher

INPUTS:	4 UXGA on 15-pin HD connectors 4 unbalanced audio stereo signals on 3.5mm mini plug connectors	
OUTPUTS:	4 UXGA on 15-pin HD connectors 4 balanced audio stereo signals on 5-pin terminal block connectors	
MAX. OUTPUT LEVEL:	VIDEO: 2.2Vpp	AUDIO: >15Vpp
BANDWIDTH (-3dB):	VIDEO: 400MHz	AUDIO: 19kHz
DIFF. GAIN:	0.07%	
DIFF. PHASE:	0.03 Deg.	
K-FACTOR:	<0.05%	
S/N RATIO:	VIDEO: 73.5dB @5MHz	AUDIO: 76dB unweighted
CROSSTALK (all hostile):	VIDEO: -48dB @5MHz	AUDIO: -54dB @1MHz
CONTROLS:	Input-output selector, AFV, VID, AUD, STO, LOCK, RCL, TAKE, DELAY, MACH. #, RS-485, RS-232, REMOTE IR	
COUPLING:	VIDEO: DC	AUDIO: AC
AUDIO THD + NOISE:	0.065% @1kHz	
AUDIO 2nd HARMONIC:	0.002% @1kHz	
POWER SOURCE:	100-240V AC, 18VA max.	
DIMENSIONS:	19-inch (W), 7-inch(D) 1U (H) rack mountable	
WEIGHT:	2.7kg (6 bs) approx	
ACCESSORIES:	Power cord, Null modem adapter, Windows®-based control software	

1 Specifications are subject to change without notice

10 Table of Hex Codes for Serial Communication

Table 6 lists the Hex values for a single machine (*MACHINE #* 1):

Table 6: Hex Codes for Switching via RS-232/RS-485

	Switching Video Channels			
	OUT 1	**OUT 2**	**OUT 3**	**OUT 4**
IN 1	01 81 81 81	01 81 82 81	01 81 83 81	01 81 84 81
IN 2	01 82 81 81	01 82 82 81	01 82 83 81	01 82 84 81
IN 3	01 83 81 81	01 83 82 81	01 83 83 81	01 83 84 81
IN 4	01 84 81 81	01 84 82 81	01 84 83 81	01 84 84 81

Table 7 lists the Hex values for switching audio channels via RS-232/RS-485:

Table 7: Hex Codes for Switching Audio Channels via RS-232/RS-485

	Switching Audio Channels			
	OUT 1	**OUT 2**	**OUT 3**	**OUT 4**
IN 1	02 81 81 81	02 81 82 81	02 81 83 81	02 81 84 81
IN 2	02 82 81 81	02 82 82 81	02 82 83 81	02 82 84 81
IN 3	02 83 81 81	02 83 82 81	02 83 83 81	02 83 84 81
IN 4	02 84 81 81	02 84 82 81	02 84 83 81	02 84 84 81

11 Kramer Protocol[1]

By default, the **VP-4x4K** is set to protocol 3000 (see section 11.2) but is also compatible with Kramer's Protocol 2000 (see section 11.3). Section 11.1 describes how to switch between protocol 3000 and protocol 2000.

11.1 Switching Protocols

You can switch protocols either via the front panel buttons (see section 11.1.1) or the protocol commands (see section 11.1.2).

11.1.1 Switching Protocols via the Front Panel Buttons

To switch from protocol 3000 to protocol 2000, press and hold[2] the IN 2 button for a few seconds.

To switch from protocol 2000 to protocol 3000, press and hold the IN 3 button for a few seconds.

11.1.2 Switching Protocols via Protocol Commands

To switch from protocol 3000 to protocol 2000, send the following command:

#P2000<CR>

To switch from protocol 2000 to protocol 3000, send the following command:

0x38, 0x80, 0x83, 0x81

The Windows®-based Kramer control software[3] operates with protocol 2000. If the **VP-4x4K** is set to protocol 3000, it is automatically switched to protocol 2000.

1 You can download our user-friendly "Software for Calculating Hex Codes for Protocol 2000" from the technical support section on our Web site at: http://www.kramerelectronics.com

2 Not as part of a switching operation

3 Download the latest software from our Web site at http://www.kramerelectronics.com

11.2 Kramer Protocol 3000

This RS-232/RS-485 communication protocol[1] lets you control the machine from any standard terminal software (for example, Windows® HyperTerminal Application).

11.2.1 Protocol 3000 Syntax

Host message format:

Start	Address (optional)	Body	Delimiter
#	*Destination_id@*	message	CR

Simple command (commands string with only one command without addressing):

start	body	delimiter
#	Command SP Parameter_1,Parameter_2,…	CR

Commands string (formal syntax with commands concatenation and addressing):

 # Address@ **Command_1** *Parameter1_1,Parameter1_2,…* |*Command_2 Parameter2_1,Parameter2_2,…* |*Command_3 Parameter3_1,Parameter3_2,…* |…**CR**

Device message format:

Start	Address (optional)	Body	Delimiter
~	*Sender_id@*	message	CR LF

Device long response (**Echoing command**):

Start	Address (optional)	Body	Delimiter
~	*Sender_id@*	**command** SP [*param1 ,param2 …*] result	CR LF

CR = Carriage return (ASCII 13 = 0x0D)

LF = Line feed (ASCII 10 = 0x0A)

SP = Space (ASCII 32 = 0x20)

1 Not available at the time of printing. Refer to our Web site at http://www.kramerelectronics.com for details

11.2.2 Command Parts Details

Command:
Sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').
Command will separate from parameters with at least single space.

Parameters:
Sequence of Alfa-Numeric ASCII chars ('0'-'9','A'-'Z','a'-'z' and some special chars for specific commands), parameters will be separated by commas.

Message string:
Every command must to be entered as part of message string that begin with **message starting char** and end with **message closing char**, note that string can contain more then one command separated by pipe ("|") char.

Message starting char:
'#' for host command\query.
'~' for machine response.

Device address (Optional, for Knet):
Knet Device ID follow by '@' char.
Query sign = '?', will follow after some commands to define query request.
Message closing char =
Host messages - Carriage Return (ASCII 13), will be referred to by **CR** in this document.
Machine messages **-** Carriage Return (ASCII 13) + Line-Feed (ASCII 10), will be referred to by **CRLF**.
Spaces between parameters or command parts will be ignored.

Commands chain separator char:
When **message string** contains more than one command, commands will be separated by pipe ("|").

Commands entering:
If terminal software used to connect over serial \ ethernet \ USB port, that possible to directly enter all commands characters (CR will be entered by Enter key, that key send also LF, but this char will be ignored by commands parser).
Sending commands from some controllers (like Crestron) require coding some characters in special form (like \X##). Anyway, there is a way to enter all ASCII characters, so it is possible to send all commands also from controller.
(Similar way can use for URL \ Telnet support that maybe will be added in future).

Commands forms:
Some commands have short name syntax beside the full name to allow faster typing, response is always in long syntax.

Commands chaining:
It is possible to enter multiple commands in same string by '|' char (pipe).
In this case the **message starting char** and the **message closing char** will be entered just one time, in the string beginning and at the end.
All the commands in string will not execute until the closing char will be entered.
Separate response will be sent for every command in the chain.

Input string max length:
64 characters.

Backward support:
Design note: transparent supporting for protocol 2000 will be implemented by switch protocol command from protocol 3000 to protocol 2000, in protocol 2000 there is already such a command to switch protocol to ASCII protocol (#56 : H38 H80 H83 H81).

Table 8: Instruction Codes for Protocol 3000

Help commands		
Command	**Syntax**	**Response**
Protocol Handshaking	#CR	~OK**CRLF**

Device initiated messages	
Command	**Syntax**
Start message	Kramer Electronics LTD. , **Device Model** Version **Software Version**
Switcher actions	
Audio-video channel has switched (AFV mode)	**AV** *IN>OUT*
Video channel has switched (Breakaway mode)	**VID** *IN>OUT*
Audio channel has switched (Breakaway mode)	**AUD** *IN>OUT*

Result codes (errors)	
	Syntax
No error. Command running succeeded	COMMAND PARAMETERS **OK**
Protocol Errors	
Syntax Error	**ERR001**
Command not available for this device	**ERR002**
Parameter is out of range	**ERR003**
Unauthorized access (running command without the match login).	**ERR004**

Basic routing commands		
Command	**Syntax**	**Response**
Switch audio & video	**AV** *IN*>*OUT*, *IN*>*OUT*, …	**AV** *IN*>*OUT*, *IN*>*OUT*,…*RESULT*
Switch video only	**VID** *IN*>*OUT*, *IN*>*OUT*, … **Short form**: **V** *IN*>*OUT*, *IN*>*OUT*, …	**VID** *IN*>*OUT*, *IN*>*OUT*, …*RESULT*
Note: When AFV mode is active, this command will switch also audio. If audio is breakaway – device display mode will change to show audio connections status.		
Switch audio only	**AUD** *IN*>*OUT*, *IN*>*OUT*, … **Short form**: **A** *IN*>*OUT*, *IN*>*OUT*, …	**AUD** *IN*>*OUT*, *IN*>*OUT*, …*RESULT*
Note: When AFV mode is active, this command will switch also video.		
Read video connection	**VID?** *OUT* **Short form**: **V?** *OUT* **VID?** *	**VID** *IN>OUT* **VID** *IN*>**1**, *IN*>**2**, …
Read audio connection	**AUD?** *OUT* **Short form**: **A?** *OUT* **AUD?** *	**AUD** *IN*>*OUT* **AUD** *IN*>**1**, *IN*>**2**, …
Parameters Description: **IN** = Input number or '0' to disconnect output. '>' = Connection character between in and out parameters. **OUT** = Output number or '*' for all outputs.		

Examples:		
Switch Video and Audio input 3 to output 7	#AV 3>7**CR**	~AV 3>7 OK**CRLF**
Switch Video input 2 to output 4	#V 2>4**CR**	~VID 2>4 OK**CRLF**
Switch Video input 4 to output 2 in machine number 6	#6@VID 4>2**CR**	~6@VID 4>2 OK**CRLF**
Disconnect Video and Audio Output 4	#AV 0>4**CR**	~AV 0>4 OK**CRLF**
Switch Video Input 3 to All Outputs	#V 3>***CR**	~VID 3>* OK**CRLF**
Chaining Multiple commands*	#AV 1>* | V 3>4, 2>2, 82>1, 0>2 |V 82>3| A 0>1 | V? * **CR** First switch all Audio and video outputs from input 1, **Then switch video input 3 to output 4, video input 2 to output 2, video input and disconnect video output 2.** Then switch audio input 3 to output 2, Then disconnect audio output 1. Then get status of all links (assume this is 4x4 matrix). Commands processing start after entering **CR**, response will sent for each command after processing it.	~AV 1>* OK**CRLF** ~VID 1>2, 3>4 OK**CRLF** ~VID 82>3 **ERR###** **CRLF** ~AUD 0>1 OK**CRLF** ~V 1>1, 0>2, 1>3, 3>4 **CRLF**

Signal Status commands		
Command	**Syntax**	**Response**
Change signal status	----------	**SIGNAL** *INPUT*, *STATUS*
Get signal status	**SIGNAL?** *INPUT*	**SIGNAL** *INPUT*, *STATUS*

Parameters Description:
INPUT = Input number, '*' for all.
STATUS = Signal state:
"0" or "off" for not existent signal.
"1" or "on" for existent signal.

Preset commands		
Command	**Syntax**	**Response**
Store current connections to preset	**PRST-STO** *PRESET* **Short form**: **PSTO** *PRESET*	**PRST-STO** *PRESET* *RESULT*
Recall saved preset	**PRST-RCL** *PRESET* **Short form: PRCL** *PRESET*	**PRST-RCL** *PRESET* *RESULT*
Delete saved preset	**PRST-DEL** *PRESET* **Short form: PDEL** *PRESET*	**PRST-DEL** *PRESET* *RESULT*
Read video connections from saved preset	**PRST-VID?** *PRESET*,*OUT* **Short form: PVID?** *PRESET*,*OUT* **PRST-VID?** *PRESET*, *	**PRST-VID** *PRESET*, *IN*>*OUT* **PRST-VID** *PRESET*, *IN*>*1*, *IN*>2,…
Read audio connections from saved preset	**PRST-AUD?** *PRESET*,*OUT* **Short form: PAUD?** *PRESET*,*OUT* **PRST-AUD?** *PRESET*, *	**PRST-AUD** *PRESET*: *IN*>*OUT* **PRST-AUD** *PRESET*: *IN*>**1**, *IN*>**2**,…

Preset commands		
Command	**Syntax**	**Response**
Read saved presets list	**PRST-LST?** **Short form: PLST?**	**PRST-LST** *PRESET*, *PRESET*, …
Parameters Description: **PRESET** = Preset number. **OUT** = Output in preset to show for, '*' for all.		

Examples:		
Store current Audio & Video connections to preset 5	#PRST-STR 5**CR**	~PRST-STR 5 OK**CRLF**
Recall Audio & Video connections from preset 3	#PRCL 3**CR**	~PRST-RCL 3 OK**CRLF**
Show source of video output 2 from preset 3	#PRST-VID? 3,2**CR**	~PRST-VID 3: 4>2 **CRLF**

Operation commands		
Command	**Syntax**	**Response**
Lock front panel	**LOCK-FP** *LOCK-MODE* **Short form: LCK** *LOCK-MODE*	**LOCK-FP** *LOCK-MODE* *RESULT*
Get front panel locking state	**LOCK-FP?**	**LOCK-FP** *LOCK-MODE*
Parameters Description: **LOCK-MODE =** Front panel locking state: "0" or "off" to unlock front panel buttons. "1" or "on" to lock front panel buttons.		
Restart device	**RESET**	**RESET OK**
Switch to protocol 2000*	**P2000**	**P2000 OK**
* Protocol 2000 has command to switch back to ASCII protocol (like protocol 3000)		

Audio parameters commands		
Command	**Syntax**	**Response**
Set audio level in specific amplifier stage.	**AUD-LVL** *STAGE*, *CHANNEL*, *VOLUME* **Short form: ADL** *STAGE*, *CHANNEL*, *VOLUME*	**AUD-LVL** *STAGE*, *CHANNEL*, *VOLUME* *RESULT*
Read audio volume level	**AUD-LVL?** *STAGE*, *CHANNEL* **Short form: ADL?** *STAGE*	**AUD-LVL** *STAGE*, *CHANNEL*, *VOLUME*
Mute audio	**MUTE** *MUTE-MODE*	**MUTE** *MUTE-MODE* *RESULT*
Read audio mute state	**MUTE?**	**MUTE** *MUTE-MODE*

Parameters Description:

STAGE =
"In","Out"
or
Numeric value (present audio processing stage). For example: "0" for Input level, "1" for Pre-Amplifier, "2" for Amplifier (Out) etc.

CHANNEL = Input or Output #

VOLUME = Audio parameter in Kramer units, precede minus sign for negative values.
++ increase current value,
-- decrease current value.

Machine info commands		
Command	**Syntax**	**Response**
* Time settings commands require admin authorization		
Read in\outs count	**INFO-IO?**	**INFO-IO: IN** *INPUTS_COUNT*, **OUT** *OUTPUTS_COUNT*
Read max presets count	**INFO-PRST?**	**INFO-PRST: VID** *PRESET_VIDEO_COUNT*, **AUD** *PRESET_AUDIO_COUNT*
Reset configuration to factory default	**FACTORY**	**FACTORY** *RESULT*

Identification commands		
Command	**Syntax**	**Response**
Protocol Handshaking	#**CR**	~**OK CRLF**
Read device model	**MODEL?**	**MODEL** *MACHINE_MODEL*
Read device serial number	**SN?**	**SN** *SERIAL_NUMBER*
Read device firmware version	**VERSION?**	**VERSION** *MAJOR* .*MINOR* .*BUILD* .*REVISION*
Set machine name	**NAME** *MACHINE_NAME*	**NAME** *MACHINE_NAME* *RESULT*
Read machine name	**NAME?**	**NAME** *MACHINE_NAME*
Reset machine name to factory default*	**NAME-RST**	**NAME-RST** *MACHINE_FACTORY_NAME* *RESULT*
*Note: machine name not equal to model name. This name relevance for site viewer identification of specific machine or for network using (with DNS feature on). *MACHINE_NAME* = Up to 14 Alfa-Numeric chars. * **Machine factory name =** Model name + last 4 digits from serial number.		
Set machine id number	**MACH-NUM** *MACHINE_NUMBER*	**MACH-NUM** *OLD_MACHINE_NUMBER* ,*NEW_MACHINE_NUMBER* *RESULT*
* Response will send after machine number has been changed. So the replay with header will be: *NEW_MACHINE_NUMBER* @**MACH-NUM** *OLD_MACHINE_NUMBER* ,*NEW_MACHINE_NUMBER* **OK**		

Network settings commands		
Set IP Address	**NET-IP** *IP_ADDRESS* **NTIP**	**NET-IP** *IP_ADDRESS* *RESULT*
Read IP Address	**NET-IP?** **NTIP**?	**NET-IP** *IP_ADDRESS*
Read MAC Address	**NET-MAC?** **NTMC**	**NET-MAC** *MAC_ADDRESS*
Set subnet mask	**NET-MASK** *SUBNET_MASK* **NTMSK**	**NET-MASK** *SUBNET_MASK* *RESULT*
Read subnet mask	**NET-MASK?** **NTMSK?**	**NET-MASK** *SUBNET_MASK*
Set gateway address	**NET-GATE** *GATEWAY_ADDRESS* **NTGT**	**NET-GATE** *GATEWAY_ADDRESS* *RESULT*
Read subnet mask	**NET-GATE?** **NTGT?**	**NET-GATE** *GATEWAY_ADDRESS*
Set DHCP mode	**NET-DHCP** *DHCP_MODE* **NTDH**	**NET-DHCP** *DHCP_MODE* *RESULT*
Read subnet mask	**NET-DHCP?** **NTDH?**	**NET-DHCP** *DHCP_MODE*
DHCP_MODE = 0 – Don't use DHCP (Use IP set by factory or IP set command). 1 – Try to use DHCP, if unavailable use IP as above.		
Change protocol ethernet port	**ETH-PORT** *PROTOCOL* , *PORT* **ETHP**	**ETH-PORT** *PROTOCOL* ,*PORT* *RESULT*
Read protocol ethernet port	**ETH-PORT?** *PROTOCOL* **ETHP?**	**ETH-PORT** *PROTOCOL* , *PORT*
PROTOCOL = TCP / UDP (transport layer protocol) *PORT* = ethernet port to enter protocol 3000 commands. 1-65535 = User defined port 0 - reset port to factory default (50000 for UDP, 5000 for TCP)		

Advanced switching commands		
Command	**Syntax**	**Response**
Set audio follow video mode	**AFV** *AFV-MODE*	**AFV** *AFV-MODE* *RESULT*
Note: This command effect device front-panel mode and AUD\VID command.		
Read audio follow video mode	**AFV?**	**AFV** *AFV-MODE*
AFV-MODE = Front panel AFV mode "0" or "afv" to set front panel switching buttons in audio-follow-video state. "1" or "brk" to set front panel switching buttons in their previous state when audio.		

11.3 Kramer Protocol 2000

This RS-232/RS-485 communication protocol uses four bytes of information as defined below. For RS-232, a null-modem connection between the machine and controller is used. The default data rate is 9600 baud, with no parity, 8 data bits and 1 stop bit.

Table 9: Protocol Definitions

MSB							LSB
	DESTI-NATION	**INSTRUCTION**					
0	D	N5	N4	N3	N2	N1	N0
7	6	5	4	3	2	1	0
1st byte							
	INPUT						
1	I6	I5	I4	I3	I2	I1	I0
7	6	5	4	3	2	1	0
2nd byte							
	OUTPUT						
1	O6	O5	O4	O3	O2	O1	O0
7	6	5	4	3	2	1	0
3rd byte							
			MACHINE NUMBER				
1	OVR	X	M4	M3	M2	M1	M0
7	6	5	4	3	2	1	0
4th byte							

1st BYTE: Bit 7 – Defined as 0.
D – "DESTINATION": 0 - for sending information to the switchers (from the PC);
1 - for sending to the PC (from the switcher).
N5…N0 – "INSTRUCTION"
The function that is to be performed by the switcher(s) is defined by the INSTRUCTION (6 bits). Similarly, if a function is performed via the machine's keyboard, then these bits are set with the INSTRUCTION NO., which was performed. The instruction codes are defined according to the table below (INSTRUCTION NO. is the value to be set for N5…N0).

2nd BYTE: Bit 7 – Defined as 1.
I6…I0 – "INPUT".
When switching (ie. instruction codes 1 and 2), the INPUT (7 bits) is set as the input number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the INPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

3rd BYTE: Bit 7 – Defined as 1.
O6…O0 – "OUTPUT".
When switching (ie. instruction codes 1 and 2), the OUTPUT (7 bits) is set as the output number which is to be switched. Similarly, if switching is done via the machine's front-panel, then these bits are set with the OUTPUT NUMBER which was switched. For other operations, these bits are defined according to the table.

4th BYTE: Bit 7 – Defined as 1.
Bit 5 – Don't care.
OVR – Machine number override.
M4…M0 – MACHINE NUMBER.
Used to address machines in a system via their machine numbers. When several machines are controlled from a single serial port, they are usually configured together with each machine having an individual machine number. If the OVR bit is set, then all machine numbers will accept (implement) the command, and the addressed machine will reply.
For a single machine controlled via the serial port, always set M4…M0 = 1, and make sure that the machine itself is configured as MACHINE NUMBER = 1.

Table 10: Instruction Codes for Protocol 2000

Note: All values in the table are decimal, unless otherwise stated.

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
0	RESET VIDEO	0	0	1
1	SWITCH VIDEO	Set equal to video input which is to be switched (0 = disconnect)	Set equal to video output which is to be switched (0 = to all the outputs)	2
2	SWITCH AUDIO	Set equal to audio input which is to be switched (0 = disconnect)	Set equal to audio output which is to be switched (0 = to all the outputs)	2
3	STORE VIDEO STATUS	Set as SETUP #	0 - to store 1 - to delete	2, 3
4	RECALL VIDEO STATUS	Set as SETUP #	0	2, 3
5	REQUEST STATUS OF A VIDEO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
6	REQUEST STATUS OF AN AUDIO OUTPUT	Set as SETUP #	Equal to output number whose status is reqd	4, 3
8	BREAKAWAY SETTING	0	0 - audio-follow-video 1 - audio breakaway	2
11	REQUEST BREAKAWAY SETTING	Set as SETUP #	0 - Request audio breakaway setting	3, 4, 6
15	REQUEST WHETHER SETUP IS DEFINED / VALID INPUT IS DETECTED	SETUP # or Input #	0 - for checking if setup is defined 1 - for checking if input is valid	8
16	ERROR / BUSY	For invalid / valid input (i.e. OUTPUT byte = 4 or OUTPUT byte = 5), this byte is set as the input #	0 - error 1 - invalid instruction 2 - out of range 3 - machine busy 4 - invalid input 5 - valid input 6 - RX buffer overflow	9, 25
22	SET AUDIO PARAMETER	Equal to input / output number whose parameter is to be set (0 = all)	Set as parameter value	2, 24
24	INCREASE / DECREASE AUDIO PARAMETER	Equal to input / output number whose parameter is to be increased / decreased (0 = all)	0 - increase output 1 - decrease output 2 - increase left output 3 - decrease left output 4 - increase right output 5 - decrease right output 6 - increase input 7 - decrease input 8 - increase left input 9 - decrease left input 10 -increase right input 11 - decrease right input	2
25	REQUEST AUDIO PARAMETER	Equal to input / output number whose parameter is requested	0	6, 24
30	LOCK FRONT PANEL	0 - Panel unlocked 1 - Panel locked	0	2
31	REQUEST WHETHER PANEL IS LOCKED	0	0	16
42	AUDIO PARAMETER SETTINGS FOR INSTRUCTIONS 22, 24, 25	INPUT Bit: I0 - 0=input; 1=output I1 - Left I2 - Right	0 - Gain 1 - Bass 2 - Treble 3 - Midrange 4 - Mix On	24
56	CHANGE TO ASCII	0	Kramer protocol 3000	19

INSTRUCTION		DEFINITION FOR SPECIFIC INSTRUCTION		NOTE
#	DESCRIPTION	INPUT	OUTPUT	
61	IDENTIFY MACHINE	1 - video machine name 2 - audio machine name 3 - video software version 4 - audio software version	0 - Request first 4 digits 1 - Request first suffix 2 - Request second suffix 3 - Request third suffix 10 - Request first prefix 11 - Request second prefix 12 - Request third prefix	13
62	DEFINE MACHINE	1 - number of inputs 2 - number of outputs 3 - number of setups	1 - for video 2 - for audio	14

NOTES on the above table:
NOTE 1 - When the master switcher is reset, (e.g. when it is turned on), the reset code is sent to the PC. If this code is sent to the switchers, it will reset according to the present power-down settings.

NOTE 2 - These are bi-directional definitions. That is, if the switcher receives the code, it will perform the instruction; and if the instruction is performed (due to a keystroke operation on the front panel), then these codes are sent. For example, if the HEX code
01 85 88 83
was sent from the PC, then the switcher (machine 3) will switch input 5 to output 8. If the user switched input 1 to output 7 via the front panel keypad, then the switcher will send HEX codes:
41 81 87 83
to the PC.
When the PC sends one of the commands in this group to the switcher, then, if the instruction is valid, the switcher replies by sending to the PC the same four bytes that it was sent (except for the first byte, where the DESTINATION bit is set high).

NOTE 3 - SETUP # 0 is the present setting. SETUP # 1 and higher are the settings saved in the switcher's memory, (i.e. those used for Store and Recall).

NOTE 4 - The reply to a "REQUEST" instruction is as follows: the same instruction and INPUT codes as were sent are returned, and the OUTPUT is assigned the value of the requested parameter. The replies to instructions 10 and 11 are as per the definitions in instructions 7 and 8 respectively. For example, if the present status of machine number 5 is breakaway setting, then the reply to the HEX code

0B 80 80 85
would be HEX codes
4B 80 81 85

NOTE 6 – If INPUT is set to 127 for these instructions, then, if the function is defined on this machine, it replies with OUTPUT=1. If the function is not defined, then the machine replies with OUTPUT=0, or with an error (invalid instruction code).

If the INPUT is set to 126 for these instructions, then, if possible, the machine will return the current setting of this function, even for the case that the function is not defined. For example, for a video switcher which always switches during the VIS of input #1, (and its VIS setting cannot be programmed otherwise), the reply to the HEX code
0A FE 80 81 (ie. request VIS setting, with INPUT set as 126dec)
would be HEX codes
4A FE 81 81 (ie. VIS setting = 1, which is defined as VIS from input #1).

NOTE 8 - The reply is as in TYPE 3 above, except that here the OUTPUT is assigned with the value 0 if the setup is not defined / no valid input is detected; or 1 if it is defined / valid input is detected.

NOTE 9 - An error code is returned to the PC if an invalid instruction code was sent to the switcher, or if a parameter associated with the instruction is out of range (e.g. trying to save to a setup greater than the highest one, or trying to switch an input or output greater than the highest one defined). This code is also returned to the PC if an RS-232 instruction is sent while the machine is being programmed via the front panel. Reception of this code by the switcher is not valid.
NOTE 10 – This code is reserved for internal use.

NOTE 13 - This is a request to identify the switcher/s in the system. If the OUTPUT is set as 0, and the INPUT is set as 1, 2, 5 or 7, the machine will send its name. The reply is the decimal value of the INPUT and OUTPUT. For example, for a 2216, the reply to the request to send the audio machine name would be (HEX codes):
7D 96 90 81 (i.e. 128dec+ 22dec for 2nd byte, and 128dec+ 16dec for 3rd byte).

If the request for identification is sent with the INPUT set as 3 or 4, the appropriate machine will send its software version number. Again, the reply would be the decimal value of the INPUT and OUTPUT - the INPUT representing the number in front of the decimal point, and the OUTPUT representing the number after it. For example, for version 3.5, the reply to the request to send the version number would be (HEX codes):

7D 83 85 81 (i.e. 128dec+ 3dec for 2nd byte, 128dec+ 5dec for 3rd byte).

If the OUTPUT is set as 1, then the ASCII coding of the lettering following the machine's name is sent. For example, for the VS-7588YC, the reply to the request to send the first suffix would be (HEX codes):

7D D9 C3 81 (i.e. 128dec+ ASCII for "Y"; 128dec+ ASCII for "C").

NOTE 14 - The number of inputs and outputs refers to the specific machine which is being addressed, not to the system. For example, if six 16X16 matrices are configured to make a 48X32 system (48 inputs, 32 outputs), the reply to the HEX code

3E 82 81 82 (ie. request the number of outputs)

would be HEX codes

7E 82 90 82

ie. 16 outputs

NOTE 16 - The reply to the "REQUEST WHETHER PANEL IS LOCKED" is as in NOTE 4 above, except that here the OUTPUT is assigned with the value 0 if the panel is unlocked, or 1 if it is locked.

NOTE 19 – After this instruction is sent, the unit will respond to the ASCII command set defined by the OUTPUT byte. The ASCII command to operate with the HEX command set must be sent in order to return to working with HEX codes.

NOTE 24 – Further information needed in instructions 21, 22, 25 and 26, is sent using instruction 42 – which is sent prior to the instruction. For example, to request the audio gain value of right input # 9, send hex codes

2A 84 80 81

and then send HEX codes

19 89 81 81.

To set MIX mode, send hex codes

2A 81 84 81

and then send HEX codes

16

NOTE 25 – For units which detect the validity of the video inputs, Instruction 16 will be sent whenever the unit detects a change in the state of an input (in real-time).

For example, if input 3 is detected as invalid, the unit will send the HEX codes

10 83 84 81

If input 7 is detected as valid, then the unit will send HEX codes

10 87 85 81.

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for seven years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed, or on which the WARRANTY VOID IF TAMPERED sticker has been torn, reattached, removed or otherwise interfered with.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

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All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC* Rules and Regulations: Part 15: "Radio frequency devices Subpart B Unintentional radiators"

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

  * FCC and CE approved using STP cable (for twisted pair products)

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

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P/N: 2900-000386 REV 1